

CLAIMS

1. Multi-stage automatic transmission having one front-mounted gearset (VS) as overdrive planet gearset, one main gearset designed as multi-member planetary gear and six shifting elements (A, B, C, D, E, F) by the selective closing of which a transmission input rotational speed of one input shaft (AN) of the multi-stage automatic transmission can be transmitted to an output shaft (AB) of the multi-stage automatic transmission so that to change from one gear to the next following higher or next following lower gear, of the precisely actuated shifting elements only one shifting element is opened and one other shifting element is closed, wherein

- one sun gear (SO_VS) of the front-mounted gearset (VS) is fixed on a transmission housing (GE) of the multi-stage automatic transmission,
- one web (ST_VS) of the front-mounted gearset (VS) is connected with the input shaft (AN) of the multi-stage automatic transmission,
- the main gearset has one first and one second rear-mounted gearset (NS1, NS2),
- one sun gear (SO_NS1) of the first rear-mounted gearset (NS1) and one sun gear (SO_NS2) of the second rear-mounted gearset (NS2) are interconnected and can be connected via the second shifting element (B) with an internal gear (HO_VS) of the front-mounted gearset (VS) and via the third shifting element (C) with the input shaft (AN),
- one web (ST_NS1) of the first rear-mounted gearset (NS1) can be fixed via the fourth shifting element (D) on the transmission housing (GE) and via the fifth shifting element (E) can be connected with the input shaft (AN),
- one internal gear (HO_NS1) of the first front-mounted gearset (NS1) and one web (ST_NS2) of the second rear-mounted gearset (NS2) are interconnected and connected with the output shaft (AB) and
- one internal gear (HO_NS2) of the second rear-mounted gearset (NS2) can be fixed via the sixth shifting element (F) on the transmission housing (GE),

characterized in that the main gearset has, in addition, one third rear-mounted gearset (NS3) wherein

- one sun gear (SO_NS3) of the third rear-mounted gearset (NS3) is coupled with the sun gear (SO_NS2) of the second rear-mounted gearset (NS2),
- one web (ST_NS3) of the third rear-mounted gearset (NS3) is coupled with the web (ST_NS2) of the second rear-mounted gearset (NS2),
- one internal gear (HO_NS3) of the third rear-mounted gearset (NS3) can be connected via the first shifting element (A) with the internal gear (HO_VS) of the front-mounted gearset (VS),
- for connecting output shaft (AB) and the coupled webs (ST_NS2, ST_NS3) of the second and third rear-mounted gearsets (NS2, NS3), one connecting element (VE) is provided which spatially viewed penetrates axially between the internal gears (HO_NS2, HO_NS3) of the second and third rear-mounted gearsets (NS2, NS3) and viewed in axial direction entirely overlaps radially the internal gear (HO_NS3) of the third rear-mounted gearset (NS3), and
- input shaft (AN) and output shaft (AB) are disposed coaxially with each other.

2. Multi-stage automatic transmission according to claim 1, characterized in that the third rear-mounted gearset (NS3) is disposed adjacent to the second rear-mounted gearset (NS2).

3. Multi-stage automatic transmission according to claim 1, characterized in that the second and third rear-mounted gearsets (NS2, NS3) are combined to form a coupled rear-mounted gearset (NS23) having two internal gears (HO_NS2, HO_NS3), one common sun gear (SO_NS23) and one common web (ST_NS23) with common planetary gears (P_NS23).

4. Multi-stage automatic transmission according to claim 1, 2 or 3, characterized in that one ratio (i_{O_NS3}) of the third rear-mounted gearset (NS3) has quantitatively the same size as one ratio (i_{O_NS2}) of the second rear-mounted gearset (NS2).

5. Multi-stage automatic transmission according to claim 1, 2 or 3, characterized in that one ratio (i_{O_NS3}) of the third rear-mounted gearset (NS3)

is quantitatively lower or higher than a ratio (i_{0_NS2}) of the second rear-mounted gearset (NS2).

6. Multi-stage automatic transmission having one front-mounted gearset (VS) designed as overdrive planet gearset, one main gearset designed as multi-member planetary gear, the same as six shifting elements (A, B, C, D, E, F) by the selective closing of which a transmission rotational speed of one input shaft (AN) of the multi-stage automatic transmission can be transmitted to an output shaft (AB) of the multi-stage automatic transmission so that to change from one gear to the next following higher or the next following lower gear, of the precisely actuated shifting elements only one shifting element is opened and one other shifting element is closed, wherein

- one sun gear (SO_VS) of the front-mounted gearset (VS) is fixed on a transmission housing (GE) of the multi-stage automatic transmission,
- one web (ST_VS) of the front-mounted gearset (VS) is connected with the input shaft (AN) of the multi-stage automatic transmission,
- the main gearset has one first rear-mounted gearset (NS1),
- one sun gear (SO_NS1) of the first rear-mounted gearset (NS1) can be connected via the second shifting element (B) with one internal gear (HO_VS) of the front-mounted gearset (VS) and via the third shifting element (C) with the input shaft (AN),
- one web (ST_NS1) of the first rear-mounted gearset (NS1) can be fixed via the fourth shifting element (D) on the transmission housing (GE) and can be connected via the fifth shifting element (E) with the input shaft (AN), and
- one internal gear (HO_NS1) of the first rear-mounted gearset (NS1) is connected with the output shaft (AB),

characterized in that the main gearset has one second rear-mounted gearset, coupled rear-mounted gearset (NS23) with two internal gears (HO_NS2, HO_NS3), one sun gear (SO_NS23) and one web (ST_NS23) wherein

- the planetary gears (P_NS23) supported on the web (ST_NS23) of the coupled rear-mounted gearset (NS23) mesh with the sun gear (SO_NS23) and both internal gears (HO_NS2, HO_NS3) of the coupled rear-mounted gearset (NS23),

- the first internal gear (HO_NS2) of the coupled rear-mounted gearset (NS23) can be fixed via the sixth shifting element (F) on the transmission housing (GE),
- the second internal gear (HO_NS3) of the coupled rear-mounted set (NS23) can be connected via the first shifting element (A) with the internal gear (HO_VS) of the front-mounted gearset (VS),
- the sun gear (SO_NS3) of the coupled rear-mounted gearset (NS23) is connected with the sun gear (SO_NS1) of the first rear-mounted gearset (NS1),
- the web (ST_NS23) of the coupled rear-mounted gearset (NS23) is connected with the internal gear (HO_NS1) of the first rear-mounted gearset (NS1),
- for connecting output shaft (AB) with the web (ST_NS23) of the coupled rear-mounted gearset (NS23), one shifting element (VE) is provided which spatially viewed penetrates axially between the internal gears (HO_NS2, HO_NS3) of the coupled rear-mounted gearset (NS23) and radially entirely overlaps, viewed in axial direction, the second internal gear (HO_NS3) of the coupled rear-mounted gearset (NS23) and
- input shaft (AN) and output shaft (AB) are disposed coaxially with each other.

7. Multi-stage automatic transmission according to claim 6, characterized in that the connecting element (VE) is attached upon the side of the coupled rear-mounted gearset (NS23) opposite the first rear-mounted gearset (NS1) to the web (ST_NS23) of the coupled rear-mounted gearset (NS23).

8. Multi-stage automatic transmission according to claim 3, 5, 6 or 7, characterized in that the planetary gears (P_NS23) of the coupled rear-mounted gearset (NS23) are designed as stepped planetary gears, the first internal gear (HO_NS2) of the coupled rear-mounted gearset (NS23) meshing with a first step of the stepped planetary gears, the second internal gear (HO_NS3) of the coupled rear-mounted gearset (NS23) meshing with a second step of the stepped planetary gears and the sun gear (SO_NS23) of the coupled rear-mounted gearset (NS23) meshing with the first or second step of the stepped planetary gears.

9. Multi-stage automatic transmission according to claim 1 to 3 or 5 to 8, characterized in that the internal gears (HO_NS2, HO_NS3) of the second and

third rear-mounted gearsets (NS2, NS3) and of the coupled rear-mounted gearset (NS23) have a slightly different number of teeth.

10. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that eight forward gears can be shifted without range shifting, there being closed in the first forward gear the third and sixth shifting elements (C, F), in the second forward gear the second and sixth shifting elements (B, F), in the third forward gear the fifth and sixth shifting elements (E, F), in the fourth forward gear the second and fifth shifting elements (B, E), in the fifth forward gear the third and fifth shifting elements (C, E), in the sixth forward gear the first and fifth shifting elements (A, E), in the seventh forward gear the first and third shifting elements (A, C) and in the eighth forward gear the first and second shifting elements (A, B).

11. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that in reverse gear the third and fourth shifting elements (C, D) are closed.

12. Multi-stage automatic transmission according to claim 1 to 11, characterized in that the third shifting element (C) is provided as starting element of the multi-stage automatic transmission.

13. Multi-stage automatic transmission according to claim 1 to 11, characterized in that the sixth shifting element (F) is provided as starting element for starting up in a forward gear and that the third or fourth shifting element (C, D) is provided as starting element for starting up in a reverse gear.

14. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the front-mounted gearset (VS) is situated on one side of the transmission housing (GE) facing a prime mover of the multi-stage automatic transmission operatively connected with the input shaft (AN).

15. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the third rear-mounted gearset (NS3) or the coupled rear-mounted gearset (NS23) is situated on one side of the transmission housing (GE) remote from the prime mover of the multi-stage automatic transmission.

16. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the rear-mounted gearsets (NS1, NS2, NS3 and NS1, NS23) of the main gearset are axially disposed side-by-side in a row.

17. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the second shifting element (B) is situated adjacent to the front-mounted gearset (VS).

18. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the second shifting element (B), particularly one servo device of the second shifting element (B), is situated axially between the front-mounted gearset (VS) and the first rear-mounted gearset (NS1).

19. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the fifth shifting element (E) is situated closer to the first rear-mounted gearset (NS1) than the third shifting element (C), specially the discs of the fifth shifting element (E) are situated closer to the first rear-mounted gearset (NS1) than the discs of the third shifting element (C).

20. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that one input element of the third and fifth shifting elements (C, E) is designed as disc carrier having a first section of radial extension situated spatially upon the side of the front-mounted gearset (VS) facing the main gearset and is connected with the input shaft (AN), a second section of axial extension which joins the first section and penetrates in axial direction the web (ST_VS) of the front-mounted gearset (VS), a third section of radial extension which joins the second section and is situated upon the side of the front-mounted gearset (VS) opposite the main gearset and extends outwardly in radial direction, the same as a fourth section of axial extension which joins the third section and extends in axial direction radially above the front-mounted gearset in direction of the main gearset up to the discs of the third and fifth shifting elements (C, E) and at the same time axially overlaps entirely the front-mounted gearset (VS).

21. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the first shifting element (A) is situated

adjacent to the third rear-mounted gearset (NS3) or adjacent to the coupled rear-mounted gearset (NS23).

22. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the first shifting element (A) is situated upon the side of the third rear-mounted gearset (NS3) remote from the second rear-mounted gearset (NS2) or upon the side of the coupled rear-mounted gearset (NS23) remote from the first rear-mounted gearset (NS1).

23. Multi-stage automatic transmission according to any one of the preceding claims, characterized in that the connecting element (VE) which connects the output element of the main gearset with the output shaft (AB), viewed in axial direction, overlaps completely radially the first shifting element (A).